

What is claimed is:

1. A method for maintaining a communication session by a back end device in a communication system, the method comprising:
  - 5 determining that the communication session has or will be disrupted;  
saving state information relating to the communication session; and  
subsequently re-establishing the communication session using the saved state information.
- 10 2. The method of claim 1, wherein determining that the communication session has or will be disrupted comprises:  
determining that the communication session has failed.
3. The method of claim 2, wherein determining that the communication  
15 session has failed comprises:  
monitoring for a predetermined signal; and  
failing to receive the predetermined signal for a predetermined amount of time.
- 20 4. The method of claim 1, wherein determining that the communication session has or will be disrupted comprises:  
determining that it is necessary or desirable to disrupt the communication session.
- 25 5. The method of claim 1, wherein saving the state information relating to the communication session comprises:  
saving the state information for up to a predetermined amount of time.
6. The method of claim 1, wherein the communication session is  
30 associated with an access point device, and wherein re-establishing the communication session using the saved state information comprises re-establishing the communication through the access point device.

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**Figure 6**

Figure 6 displays 18 histograms showing the distribution of the number of nodes per cluster for different values of  $\alpha$ . The x-axis for all plots is labeled "Nodes per Cluster" and ranges from 0 to 10. The y-axis is labeled "Frequency". The plots are arranged in two columns of nine rows each.

The left column corresponds to  $\alpha = 0.001$  and the right column to  $\alpha = 0.005$ . Within each column, the rows correspond to increasing values of  $n$ : 100, 200, 300, 400, 500, 600, 700, 800, and 900. As  $n$  increases, the distributions become more concentrated at lower node counts (e.g., 1 or 2 nodes per cluster).

10. A device for maintaining a communication session, the device comprising:

session monitoring logic operably coupled to determine that the communication session has or will be disrupted;

5 state maintenance logic operably coupled to save state information relating to the communication session; and

session re-establishment logic operably coupled to subsequently re-establish the communication session using the saved state information.

10 11. The device of claim 10, wherein the session monitoring logic is operably coupled to determine that the communication session has failed.

12. The device of claim 11, wherein the session monitoring logic is operably coupled to monitor for a predetermined signal and determine that  
15 the communication session has failed upon failing to receive the predetermined signal for a predetermined amount of time.

13. The device of claim 10, wherein the session monitoring logic is operably coupled to determine that it is necessary or desirable to disrupt the  
20 communication session.

14. The device of claim 10, wherein the state maintenance logic is operably coupled to save the state information for up to a predetermined amount of time.

25 15. The device of claim 10, wherein the communication session is associated with an access point device, and wherein the session re-establishment logic is operably coupled to re-establish the communication session through the access point device using the saved state information.

30 16. The device of claim 10, wherein the communication session is associated with an access point device, and wherein the session re-

17. The device of claim 16, wherein the session re-establishment logic is operably coupled to associate the state information with the different access point device.

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20. A computer program for controlling a computer system to maintain a communication session, the computer program comprising:

session monitoring logic programmed to determine that the communication session has or will be disrupted;

5 state maintenance logic programmed to save state information relating to the communication session; and

session re-establishment logic programmed to subsequently re-establish the communication session using the saved state information.

10 21. The computer program of claim 20, wherein the session monitoring logic is programmed to determine that the communication session has failed.

22. The computer program of claim 21, wherein the session monitoring logic is programmed to monitor for a predetermined signal and determine  
15 that the communication session has failed upon failing to receive the predetermined signal for a predetermined amount of time.

23. The computer program of claim 20, wherein the session monitoring logic is programmed to determine that it is necessary or desirable to disrupt  
20 the communication session.

24. The computer program of claim 20, wherein the state maintenance logic is programmed to save the state information for up to a predetermined amount of time.

25 25. The computer program of claim 20, wherein the communication session is associated with an access point device, and wherein the session re-establishment logic is programmed to re-establish the communication session through the access point device using the saved state information.

30 26. The computer program of claim 20, wherein the communication session is associated with an access point device, and wherein the session re-

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29. The computer program of claim 20, further comprising:  
protocol logic for implementing upper protocol layers of a wireless communication protocol.

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30. A communication system comprising a number of access point devices that each implement a first protocol layer of a wireless communication protocol and a back end device that implements a second protocol layer of the wireless communication protocol on behalf of the number of access point  
5 devices, wherein the back end device is operably coupled to save state information for a communication session upon determining that the communication session has or will be disrupted and subsequently re-establish the communication session using the saved state information.

10 31. The communication system of claim 30, wherein the communication session is associated with an access point device, and wherein the back end device is operably coupled to re-establish the communication session through the access point device.

15 32. The communication system of claim 30, wherein the communication session is associated with an access point device, and wherein the back end device is operably coupled to re-establish the communication session through a different access point device.

20 33. The communication system of claim 32, wherein the back end device is operably coupled to associate the saved state information with the different access point device.

25 34. The communication system of claim 30, wherein the wireless communication protocol comprises a Bluetooth wireless communication protocol.

30 35. The communication system of claim 34, wherein the first protocol layer is a lower protocol layer of the Bluetooth wireless communication protocol, and wherein the second protocol layer comprises an upper protocol layer of the Bluetooth wireless communication protocol.

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Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	



37. In a communication system in which a terminal device accesses a communication network through one of a plurality of access point devices that implement a first protocol layer of a wireless communication protocol and a back end device that implements a second protocol layer of the wireless communication protocol, a method for moving the terminal device from a first access point device to a second access point device, the method comprising:

saving state information for the terminal device by the back end device;  
terminating communication with the terminal device over the first access point device; and  
re-establishing communication with the terminal device over the second access point device using the saved state information.

38. The method of claim 37, wherein the first access point device is congested, and wherein re-establishing communication with the terminal device over the second access point device using the saved state information is done to avoid the congestion at the first access point device.

39. The method of claim 37, wherein re-establishing communication with the terminal device over the second access point device using the saved state information is done for load balancing purposes to split network traffic between the first access point device and the second access point device.

40. The method of claim 37, wherein the first access point device and the second access point device are in different service provider systems, and wherein re-establishing communication with the terminal device over the second access point device using the saved state information is done to move the terminal device to a predetermined service provider system.

41. The method of claim 37, wherein re-establishing communication with the terminal device over the second access point device using the saved state

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information is done for cost purposes to move the terminal device to a less expensive access point device.

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42. In a communication system in which a terminal device accesses a communication network through one of a plurality of access point devices that implement a first protocol layer of a wireless communication protocol and a back end device that implements a second protocol layer of the wireless communication protocol, a method for using information related to the terminal device, the method comprising:

saving information for the terminal device by the back end device; and  
using the saved information.

43. The method of claim 42, wherein using the saved information comprises:

using the saved information for accounting purposes.

44. The method of claim 42, wherein using the saved information comprises:

using the saved information for network management purposes.

45. The method of claim 42, wherein using the saved information comprises:

using the saved information for user tracking purposes.

46. The method of claim 42, wherein using the saved information comprises:

using the saved information for user locating purposes.